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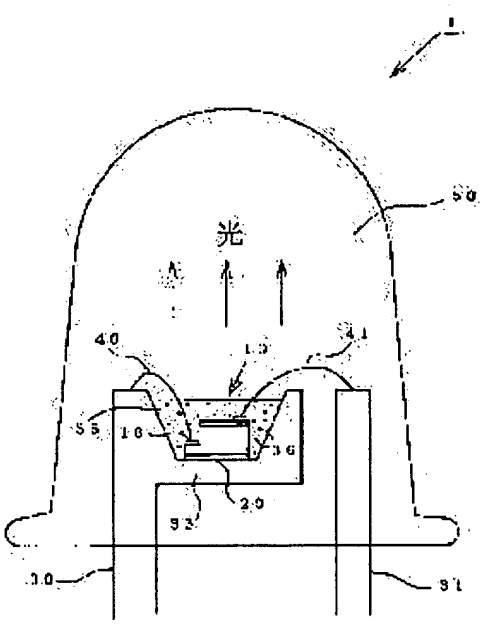
(54) LIGHT-EMITTING DEVICE



(57)Abstract:
PROBLEM TO BE SOLVED: To provide a light-emitting device, which is of a new constitution and capable of emitting white light.
SOLUTION: A primary light source, formed of III nitride compound semiconductor and a secondary light source, which contains a fluorescent material that is excited by light emitted from the primary light source to emit green light are combined for use. Furthermore, a third light source which emits red light is combined with them for use.

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[Claim(s)]

[Claim 1] It is luminescence equipment which comes to have the primary light source which comes to have the semi-conductor light emitting device whose luminescence wavelength is 380nm - 500nm, and the secondary light source containing the fluorescent substance with which it consists of ZnS:Cu, and Au and aluminum, and emits light in the light of the luminescent color which said secondary light source emits light by the light from said primary light source, and the light of this secondary light source and the light of said primary light source are mixed, and is different from the light from said primary light source.

[Claim 2] The primary light source which comes to have the semi-conductor light emitting device whose luminescence wavelength is 380nm - 500nm, The secondary light source containing 1 or two or more fluorescent substances which are chosen from ZnS:Eu, YVO4:Ce, and Y2O2 S:Ce, It is luminescence equipment which said secondary light source emits light by the light from said primary light source in ********, and emits light in the light of the luminescent color which the light of this secondary light source and the light of said primary light source are mixed, and is different from the light from said primary light source.

[Claim 3] Luminescence equipment which it comes to have the primary light source which comes to have the semi-conductor light emitting device of a blue system, the secondary light source containing the 1st fluorescent substance which absorbs the light of said primary light source and emits the light of a green system, and the 3rd light source which emits light in the light of a red system, and the light of said primary light source, the light of said secondary light source, and the light of said 3rd light source are mixed, and emits light in the light of a white system.

[Claim 4] Said 1st fluorescent substance is luminescence equipment according to claim 3 characterized by what is been 1 or two or more fluorescent substances which are chosen from ZnS:Cu, Au and aluminum, ZnS:Cu, aluminum, ZnS:Cu, ZnS:Mn, ZnS:Eu, YVO4:Eu, YVO4:Ce, Y2O2 S:Eu, and Y2O2 S:Ce**.

[Claim 5] Said 3rd light source is luminescence equipment according to claim 3 or 4

characterized by what the 2nd fluorescent substance which absorbs the light of said primary light source and emits the light of a red system is included for.

[Claim 6] Said 2nd fluorescent substance is luminescence equipment according to claim 5 characterized by what is consisted of CaS:Eu.

[Claim 7] Said 3rd light source is luminescence equipment according to claim 3 or 4 characterized by the thing it comes to have the semi-conductor light emitting device which emits light in the light of a red system.

[Claim 8] Said fluorescent substance is distributed in the 1st layer which consists of a light transmission nature ingredient, and a part of light from said primary light source penetrates said 1st layer. And a part of other light from said primary light source is luminescence equipment according to claim 1 to 7 characterized by what it is absorbed by said fluorescent substance, this is made to emit light, and light is emitted for in the light of the luminescent color which the light from this fluorescent substance and the light from said primary light source are mixed, and is different from the light from said primary light source.

[Claim 9] Said 1st layer is luminescence equipment according to claim 8 characterized by what is consisted of 1 or two or more ingredients which are chosen from an epoxy resin, silicone resin, a urea-resin, and glass.

[Claim 10] Luminescence equipment according to claim 8 or 9 characterized by what said 1st layer is formed for so that said light emitting device which said light emitting device was fixed to the cup section of a leadframe, and was fixed to this cup section may be covered.

[Claim 11] Luminescence equipment according to claim 10 characterized by what said light emitting device, said 1st layer, and the closure member that covers said a part of leadframe are prepared for.

[Claim 12] Said closure member is luminescence equipment according to claim 11 characterized by what is consisted of 1 or two or more ingredients which are chosen from an epoxy resin, silicon resin, a urea-resin, and glass.

[Claim 13] Said closure member is luminescence equipment according to claim 11 or 12 characterized by what is formed in a shell mold.

[Claim 14] Luminescence equipment according to claim 8 to 13 characterized by what is changed continuously [the amount of said fluorescent substance], or gradually in said 1st layer as said light emitting device is approached.

[Claim 15] Said the 1st layer and said closure member are luminescence equipment according to claim 11 to 13 characterized by what is consisted of the same ingredient.

[Claim 16] It is luminescence equipment according to claim 8 characterized by

what is formed so that said light emitting device may be a chip mold and said 1st layer may cover said light emitting device.

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to luminescence equipment. In detail, it is related with the luminescence equipment which can emit light in the light of a white system as a whole with the combination of an III group nitride system compound semiconductor light emitting device and a fluorescent substance.

[0002]

[Description of the Prior Art] The luminescence equipment which can emit light in the light of a white system is indicated by JP,10-242513,A with the light emitting diode of a blue system, and the combination of a photo-luminescence fluorescent substance. With luminescence equipment given in the official report concerned, luminescence of a white system has been obtained using the yttrium aluminum garnet system fluorescent substance activated with the cerium (Ce) which absorbs luminescence from the light emitting diode of a blue system as a fluorescent substance, and emits light in a yellow system with the color mixture of luminescence of the blue system from light emitting diode, and luminescence of the yellow system from a fluorescent substance.

[0003]

[Means for Solving the Problem] this invention persons examined wholeheartedly the combination of a light emitting device and various fluorescent substances so that they may get the luminescence equipment which can emit light in a white system by the new configuration. Consequently, it turned out that there is a fluorescent substance to which the light of a white system emits light by mixing with the light which has an absorption spectrum to the light which emits light from a light emitting device in a ZnS system fluorescent substance, and emits light from a light emitting device, and the light in which a fluorescent substance excites and emits light by the light from a light emitting device. This invention is made as a result of the above examination, and the configuration in the 1st aspect of affairs of this invention is as follows. It is luminescence equipment which comes to have the primary light source which comes to have the semi-conductor light emitting device whose luminescence wavelength is 380nm - 500nm, and the secondary light source containing the fluorescent substance with which it consists of ZnS:Cu, and Au and aluminum, and emits light in the light of the luminescent color which said secondary light source emits light by the light from said primary light source, and

the light of this secondary light source and the light of said primary light source are mixed, and is different from the light from said primary light source.

[0004] According to the above-mentioned configuration, a fluorescent substance excites by the light from the primary light source, and the light of the wavelength from which the light from the primary light source and wavelength differ is emitted. The light of the luminescent color which differs from the light from the primary light source by mixing with the light from the secondary light source and the light from the primary light source containing this fluorescent substance will be taken out. Since the fluorescent substance which excites and emits light with a well head by light with a luminescence wavelength of 380nm - 500nm as a fluorescent substance is used, high brightness and efficient luminescence equipment are obtained. Furthermore, according to examination of this invention persons, by using ZnS:Eu, YVO4:Ce, or Y2O2 S:Ce as a fluorescent substance showed that a red system component became rich in the light from a fluorescent substance.

[0005]

[Embodiment of the Invention] Although especially the formation ingredient of the semi-conductor light emitting device which constitutes the primary light source is not limited, what is in the range whose luminescence wavelength is 380nm - 500nm, for example is used. Preferably, that whose luminescence wavelength is 420nm - 490nm is used. That whose luminescence wavelength is 450nm - 475nm is used still more preferably. As this semi-conductor light emitting device, an III group nitride system compound semiconductor is used suitably. Here, an III group nitride system compound semiconductor light emitting device is a semi-conductor light emitting device equipped with an III group nitride system compound semiconductor layer. An III group nitride system compound semiconductor is expressed with AlXGaYIn1-X-YN (0<=X<=1, 0<=Y<=1, 0 <=X+Y<=1) as a general formula, and includes the so-called 3 yuan system of the so-called 2 yuan system of AlN, GaN, and InN, AlxGa1-xN, AlxIn1-xN, and GaxIn1-xN (it sets above and is 0<=x<=1). Boron (B), a thallium (Tl), etc. may permute some III group elements, and Lynn (P), an arsenic (As), antimony (Sb), a bismuth (Bi), etc. can permute some nitrogen (N). As for the component functional division of a light emitting device, it is desirable to constitute from an above-mentioned 2 yuan system or an III group nitride system compound semiconductor of a 3 yuan system. An III group nitride system compound semiconductor may contain the dopant of arbitration. Si, germanium, Se, Te, C, etc. can be used as an n mold impurity. As a p mold impurity, Mg, Zn, Be, calcium, Sr, Ba, etc. can be used. In addition, after doping p mold

impurity, an III group nitride system compound semiconductor is exposable to electron beam irradiation, a plasma exposure, or heating at a furnace. An III group nitride system compound semiconductor can be formed by the molecular-beam crystal growth method (MBE law) of common knowledge besides metal-organic chemical vapor deposition (MOCVD law), halide system vapor growth (HVPE law), the spatter, the ion plating method, a cascade shower method, etc. Although the construction material of the substrate into which an III group nitride system compound semiconductor layer is grown up will not be limited especially if an III group nitride system compound semiconductor layer is grown up, sapphire, a spinel, silicon, carbonization silicon, a zinc oxide, gallium phosphide, gallium arsenide, a magnesium oxide, manganese oxide, an III group nitride system compound semiconductor single crystal, etc. can be mentioned as an ingredient of a substrate, for example. Especially it is desirable to use silicon on sapphire, and it is still more desirable to use the a-th page of silicon on sapphire.

[0006] One or two or more fluorescent substances which are chosen from ZnS:Cu, Au and aluminum, ZnS:Cu, aluminum, ZnS:Cu, ZnS:Mn, ZnS:Eu, YVO4:Eu, YVO4:Ce, Y2O2 S:Eu, and Y2O2 S:Ce are used for the fluorescent substance contained in the secondary light source. Here, in ZnS:Cu, and Au and aluminum, it is the photo-luminescence fluorescent substance of the ZnS system activated with Cu, Au, and aluminum by using ZnS as a parent, and is the photo-luminescence fluorescent substance activated by Cu, and aluminum, Cu, Mn and Eu by using ZnS as a parent as well as ZnS:Cu, aluminum, ZnS:Cu, ZnS:Mn, and ZnS:Eu, respectively. It is the fluorescent substance which similarly YVO4:Eu and YVO4:Ce used YVO4 as the parent, and was activated by Eu and Ce, respectively, and Y2O2 S:Eu and Y2O2 S:Ce are the fluorescent substances activated by Eu and Ce by using Y2O2 as a parent, respectively. These fluorescent substances have an absorption spectrum to the light of blue - green, and emit light in light with wavelength longer than excitation wavelength.

[0007] Also in the above-mentioned fluorescent substance, since it is long as compared with other fluorescent substances, as for the light from which the luminescent color from these fluorescent substances is obtained by mixing with the light which is a red system more, consequently is emitted from these fluorescent substances, and the light from the light emitting device which is the primary light source, luminescence wavelength [as opposed to the excitation light of blue - green in ZnS:Eu, YVO4:Ce, and Y2O2 S:Ce] serves as a color more near white. Thus, in order to obtain the luminescent color more near white, it is desirable to choose 1 chosen from ZnS:Eu, YVO4:Ce, and Y2O2 S:Ce or 2 or more as a fluorescent

substance.

[0008] The secondary light source containing a fluorescent substance is prepared in the location where the light from the primary light source is irradiated, and emits light by the light from the primary light source. By mixing the light from this secondary light source, and the light from the primary light source, luminescence of the color of the primary light source and a different color is obtained as a whole. If the light emitting device from which luminescence wavelength differs is used, the luminescent color can be changed also by being able to change the luminescent color obtained and changing the presentation of a fluorescent substance.

[0009] By using the fluorescent substance of a ZnS system, there are the following advantages as compared with the case where the rare earth activation fluorescent substance which are other typical fluorescent substances is used. In the fluorescent substance of a ZnS system, since the concentration of an activator may be small as compared with a rare-earth-elements activation fluorescent substance, baking performs diffusion into the ZnS grid of an activator, and growth of a ZnS particle using ZnS compounded beforehand. On the other hand, the comparatively complicated reaction that many of rare-earth-elements activation fluorescent substances perform generation of a compound, diffusion of an activator, and growth of a particle by baking is needed. Moreover, generally the fluorescent substance of burning temperature of a ZnS system is lower. Thus, it is advantageous on composition of a fluorescent substance to use the fluorescent substance of a ZnS system.

[0010] It is made to distribute preferably in the layer which consists of an ingredient of light transmission nature, and a fluorescent substance is used. As an ingredient of light transmission nature, an epoxy resin, silicon resin, a urea-resin, or glass is used. Two or more sorts of ingredients chosen as arbitration from these can also be used for these ingredients not to mention being used independently. The purpose of use, a service condition, etc. can be accepted and concentration distribution of the fluorescent substance in the ingredient of light transmission nature can be changed. That is, the amount of a fluorescent substance is changed continuously or gradually as a light emitting device is approached. For example, concentration of a fluorescent substance is enlarged in the part near a light emitting device. Thereby, the light from a light emitting device can be irradiated efficiently at a fluorescent substance. On the other hand, it is easy to be influenced of the heat generated in a light emitting device, and degradation of a fluorescent substance poses a problem. On the other hand, degradation of the fluorescent substance resulting from generation of heat of a light emitting device is controlled

by making concentration of a fluorescent substance small as a light emitting device is approached. The layer which consists of an ingredient of the light transmission nature containing a fluorescent substance is prepared in the luminescence direction of the primary light source. Although it is preferably formed so that the luminescence direction side of the primary light source may be covered, the layer thru/or space which consists of another light transmission nature ingredient can also be prepared between layers and the primary light sources concerned.

[0011] As explained in the top, it consists of a layer which distributed the specific fluorescent substance in the layer which the secondary light source becomes from a light transmission nature ingredient, and, in a configuration of that the light from the primary light source passes the layer concerned, the light of the primary light source and the light of the secondary light source are automatically mixed in the layer concerned. However, the mode which mixes the light from the primary light source and the light from the secondary light source is not limited above. For example, a fluorescent substance is arranged in the shape of an island around the primary light source. And the light of the primary light source can pass through between the islands of a fluorescent substance, and can mix the light from a fluorescent substance in a closure member. In this case, the light of the primary light source does not penetrate the island of a fluorescent substance. Moreover, a fluorescent substance is arranged in the location from which it separated from the optical axis from the primary light source in luminescence equipment, it condenses and has the light from a fluorescent substance in it in the direction of an optical axis using a reflecting plate etc., and you may make it mix the light from the primary light source, and the light from the fluorescent substance which is the secondary light source.

[0012] The luminescence equipment of this invention can consider using white for high density and the light emitting diode display (henceforth an "LED display equipment") displayed with high definition. In the LED display equipment in which the conventional full color display is possible, it considered as 1 pixel combining each LED of RGB, and white luminescence had been obtained for them luminescence and by carrying out color mixture. That is, three LED needs to emit light for a white display, and the viewing area was large compared with the case of monochrome luminescence, such as green and red. For this reason, white was not able to be displayed with high definition like cases, such as green. With the luminescence equipment in this invention, since luminescence of a white system may be independently realizable, a white display can be obtained to high density and a high definition like luminescence of green, red, etc. by using in addition to

each LED of RGB. Moreover, there is also an advantage that control of the burning condition of the light emitting device of 1 can adjust a white display. Furthermore, since it does not indicate by white with the color mixture of the luminescent color of each LED of RGB like before, change cannot arise in a check-by-looking color with the include angle to see, and an irregular color can also be reduced. In addition, if it is used combining with each LED of RGB, the rise of the luminous intensity in a white display and brightness will be achieved by performing simultaneously the white display by the color mixture of RGB, and the white display by the luminescence equipment of this invention.

[0013] Next, the 2nd aspect of affairs of this invention is explained. this invention persons found out the following technical problems, as a result of inquiring in a detail further in order to obtain luminescence of a white system by high brightness. That is, set in the configuration in the 1st aspect of affairs of above-mentioned this invention, and excited the fluorescent substance, it was made to emit light by a part of light of the semi-conductor light emitting device of a blue system, and luminescence of a white system has been obtained by mixing the light from this fluorescent substance, and the light taken out from a semi-conductor light emitting device direct picking. However, the light from which the emission spectrum by excitation of the light of the blue system of the fluorescent substance adopted in the 1st aspect of affairs is obtained by mixing the light and the light from a blue system semi-conductor light emitting device which a peak exists in a green wavelength field from yellow, and a fluorescent substance excites, and emit light was the green white which was, carried out and required blueness. When putting in another way, the red component was weak, and the optimal thing was not able to be told to luminescence of the white system obtained in the 1st aspect of affairs in order to use as a source for lighting of the white light. When using as a back light of the liquid crystal display of a full color display especially, there was a problem that a red display became weak.

[0014] Invention in the 2nd aspect of affairs of this invention is made that the above-mentioned technical problem should be solved, and it aims at offering the luminescence equipment which can emit light in more desirable white as a source for lighting of the white light. The configuration is as follows. Luminescence equipment which it comes to have the primary light source which comes to have the semi-conductor light emitting device of a blue system, the secondary light source containing the 1st fluorescent substance which absorbs the light of said primary light source and emits the light of a green system, and the 3rd light source which emits light in the light of a red system, and the light of said primary light

source, the light of said secondary light source, and the light of said 3rd light source are mixed, and emits light in the light of a white system.

[0015] According to such a configuration, in addition to the light of the blue system from the semi-conductor light emitting device which is the primary light source, and the light of the green system by a fluorescent substance exciting and emitting light by a part of the light, the light of a red system is separately supplied as the 3rd light source. Consequently, the light of the three-primary-colors slack RGB of light can be mixed with sufficient balance, and the white light of high quality is acquired more. Moreover, since the fluorescent substance adopted as the secondary light source changes the light of a blue system into the light of a green system and conversion in the light of a green system of a blue system from light is performed with a well head, the light of the blue system from the primary light source can be used effectively. Consequently, the luminescence equipment of high brightness is obtained. When LED is considered as a light emitting device here, now compared with the radiant power output of LED of a red system, the radiant power output of LED of a blue system is very large. If a part of light of LED of a blue system is used for excitation of a fluorescent substance like invention of this 2nd aspect of affairs, since the amount of [of a blue system] Mitsunari decreases, it will become easy to maintain luminescence balance with the 3rd light source which emits light in the light of a red system. If it puts in another way, the light of the green system which luminescence of is attained near the full power, consequently is emitted from a fluorescent substance can also become large, it can have the blue system LED, and luminescence equipment can be worked efficiently.

[0016] The configuration and the formation approach of the primary light source are the same as that of the case of the primary light source in the 1st aspect of affairs of above-mentioned this invention.

[0017] The 1st fluorescent substance contained in the secondary light source can emit light in the light of a green system to the excitation light of a blue system. Preferably, 1 or two or more fluorescent substances which are chosen from ZnS:Cu, Au and aluminum, ZnS:Cu, aluminum, ZnS:Cu, ZnS:Mn, ZnS:Eu, YVO4:Eu, YVO4:Ce, Y2O2 S:Eu, and Y2O2 S:Ce are adopted. These fluorescent substances have an absorption spectrum to the light of a blue system (blue - bluish green color), and emit light in the light of a green system with wavelength longer than excitation wavelength.

[0018] The secondary light source containing the 1st fluorescent substance is prepared in the location where the light from the primary light source is irradiated, and emits light by the light from the primary light source. By mixing the light from

this secondary light source, the light from the primary light source, and the light from the 3rd below-mentioned light source, luminescence of a white system is obtained as a whole. If the light emitting device from which luminescence wavelength differs as the primary light source is used, the luminescent color can be changed also by being able to change the luminescent color obtained and changing the presentation of a fluorescent substance. When the fluorescent substance of a ZnS system is used, as compared with the case where the rare earth activation fluorescent substance which are other typical fluorescent substances is used, the advantageous thing on fluorescent substance composition is as having explained in the 1st aspect of affairs of the above. The configuration method of the 1st fluorescent substance is the same as that of the case in the 1st aspect of affairs of the above, and it is made to distribute in the layer which consists of a light transmission ingredient, or it is arranged in the shape of an island around the primary light source. Moreover, it is the same as that of the case in the 1st aspect of affairs that concentration distribution of a fluorescent substance can be changed with a relative position with the primary light source.

[0019] As the 3rd light source, the 2nd fluorescent substance or semi-conductor light emitting device can be used. The 2nd fluorescent substance can emit light in the light of pink thru/or a red system to the excitation light of a blue system. Preferably, CaS:Eu is used. The 2nd fluorescent substance is prepared in the location where the light from the primary light source is irradiated like the 1st fluorescent substance of the above, and emits light by the light from the primary light source. The configuration method of the 2nd fluorescent substance is the same as that of the 1st fluorescent substance of the above, namely, it is made to distribute in the layer which consists of a light transmission ingredient, or it is arranged in the shape of an island around the primary light source. The 2nd fluorescent substance is also distributed in the layer of the light transmission nature by which the 1st fluorescent substance which constitutes the secondary light source is distributed preferably. If it puts in another way, the layer of the light transmission nature which distributed two kinds of fluorescent substances which constitute the secondary light source and the 3rd light source will be prepared in the perimeter of the primary light source. Of course, the layer which distributed each fluorescent substance can also be prepared in the perimeter of the primary light source, respectively. In addition, concentration distribution of the 2nd fluorescent substance can be changed with a relative position with the primary light source like the case of the 1st fluorescent substance.

[0020] The semi-conductor light emitting device used as the 3rd light source will

not be limited especially if light is emitted in the light of a red system, but it can use a well-known thing. For example, what consists of gallium aluminum arsenic is used. Although especially the configuration method of the semi-conductor light emitting device of a red system is not limited, it adjoins the primary light source preferably, or is arranged around the primary light source. Moreover, it is not limited especially about physical relationship with the secondary light source, either. For example, when forming the layer which contained the 1st fluorescent substance as the secondary light source, the layer concerned is prepared in the perimeter of the primary light source, and the 3rd light source equipped with the light emitting device of a red system apart from this is established. Moreover, the primary light source and the 3rd light source can be established adjacently, and the layer containing the 1st fluorescent substance can also be formed in the perimeter of both the light sources. Furthermore, once condensing the light from the primary light source and the 3rd light source, a part of this light can also be irradiated at the 1st fluorescent substance, a fixed distance is kept from 3rd the primary light source and from in this case, and the secondary light source is arranged. As the 3rd light source, the 2nd fluorescent substance and the semi-conductor light emitting device of a red system can also be used collectively. According to this configuration, the luminescent color of the whole luminescence equipment can be adjusted by adjusting the burning condition of the semi-conductor light emitting device of a red system.

[0021]

[Example] An example explains the configuration of this invention to a detail more below.

(Example 1) Drawing 1 is drawing showing the luminescence equipment 1 which is the example of 1 in the 1st aspect of affairs of this invention, and the sectional view of the light emitting device 10 used for luminescence equipment 1 is shown in drawing 2 . The spec. of each class of a light emitting device 10 is as follows.

Layer : Presentation: Dopant (thickness)

p type layer 15 : p-GaN:Mg (0.3 micrometers)

Luminous layer 14 : Superstructure Quantum well layer : In0.15Ga0.85N (3.5nm)

Barrier layer : GaN (3.5nm)

The number of repeats of a quantum well and a barrier layer: 1-10n type layer 13 : n-GaN:Si (4 micrometers)

Buffer layer 12 : AlN (10nm)

Substrate 11 : Sapphire (300 micrometers)

[0022] a buffer layer 12 is used in order to grow up the semi-conductor layer of high

quality -- having -- well-known MOCVD -- it is formed on substrate 11 front face of law etc. Although AlN was used as a buffer layer in this example it is limited to this -- ******** -- the duality of GaNInN -- a system and the III group nitride system compound semiconductor (ternary system) generally expressed with AlxGayN (0<=x<=1, 0<=y<=1, x+y=1) -- The III group nitride system compound semiconductor (4 yuan system) furthermore expressed with AlaGabIn1-a-bN (0<=a<=1, 0<=b<=1, a+b<=1) can also be used. each semi-conductor layer -- well-known MOCVD -- it is formed of law. In this grown method, ammonia gas and the alkyl compound gas of an III group element, for example, trimethylgallium, (TMG), trimethylaluminum (TMA), and trimethylindium (TMI) are supplied on the substrate heated by suitable temperature, a pyrolysis reaction is carried out, it has, and a desired crystal is grown up on a buffer layer 12. of course, the thing by which the formation approach of each semi-conductor layer is limited to this -- it is not -- well-known MBE -- it can form also by law. As structure of a luminous layer, a luminous layer 14 may not be limited to the thing of a superstructure, but may be a terrorism mold and a gay assembling die in a terrorism mold and double to a single. In addition, a luminous layer can also be constituted using MIS junction and PIN junction.

[0023] The large AlXGaYIn1-X-YN (0<=X<=1, 0<=Y<=1, X+Y<=1) layer of the band cap which doped acceptors, such as magnesium, can be made to intervene between a luminous layer 14 and p type layer 15. This is for preventing that the electron poured in into the luminous layer 14 is spread in p type layer 15. p type layer 15 can be made into the two-layer structure which consists of a low hole concentration p-layer by the side of a luminous layer 14, and a high hole concentration p+ side of the p electrode 18.

[0024] After the n electrode 19 consists of two-layer [of aluminum and V] and forms p type layer 15, it removes a part of p type layer 15, luminous layer 14, and n type layer 13 by etching, and is formed on n type layer 13 of vacuum evaporationo. The translucency electrode 17 is a thin film containing gold, it covers the substantial whole surface of the top face of p type layer 18, and a laminating is carried out. The p electrode 18 also consists of ingredients containing gold, and it is formed on the translucency electrode 17 of vacuum evaporationo. After forming each semi-conductor layer and each electrode according to the above-mentioned process, the separation process of each chip is performed.

[0025] A reflecting layer can also be prepared between a luminous layer 14 and substrates 11 or in the field in which the semi-conductor layer of a substrate 11 is not formed. By preparing a reflecting layer, it is generated in a luminous layer 14,

and the reflected thing to the direction of ejection of light can do efficiently light which went to the substrate side, consequently improvement in luminous efficiency can be aimed at. Drawing 3 and drawing 4 show the light emitting devices 100 and 101 equipped with a reflecting layer, respectively. In addition, in light emitting devices 100 and 101, the same sign is given to the same member as a light emitting device 10. In a light emitting device 100, a reflecting layer 25 is formed directly under a luminous layer 14. A reflecting layer 26 is formed in the field in which the semi-conductor layer of a substrate 11 is not formed in a light emitting device 101. A reflecting layer 25 is formed with a metal nitride. Preferably, one kind chosen from titanium nitride, zirconium nitride, and tantalum nitride or two kinds or more are chosen and used for arbitration. A reflecting layer 26 can be formed with a metal nitride like a reflecting layer 25. Moreover, a reflecting layer 26 can also be formed using the alloy which consists of two or more sorts of metals chosen as arbitration the simple substance of metals, such as aluminum, In, Cu, Ag, Pt, Ir, Pd, Rh, W, Mo, Ti, and nickel, or out of these.

[0026] A light emitting device 10 is mounted on the cup section 33 prepared in a leadframe 30 by adhesives 20. Adhesives 20 are the silver pastes with which silver was mixed as a filler in the epoxy resin. Stripping of the heat from a light emitting device 10 becomes good by using this silver paste.

[0027] The cup section 33 is filled up with the epoxy resin (henceforth "fluorescent substance resin") 35 which distributed the fluorescent substance 36 uniformly. The cup section 33 can also be filled up with the epoxy resin containing this fluorescent substance 36 after the below-mentioned wirebonding. Moreover, before mounting a light emitting device 10 on the cup section 33, the layer containing a fluorescent substance 36 may be formed in the front face of a light emitting device 10. For example, by dipping a light emitting device 10 into the epoxy resin containing a fluorescent substance 36, a fluorescent substance resin layer is formed in the front face of a light emitting device 10, a silver paste is used for the cup section 33, and a light emitting device 10 is mounted on it after that. As the formation approach of a fluorescent substance resin layer, it is based on the above-mentioned DIP, and also sputtering, spreading, or paint can also be used. ZnS:Cu, and Au and aluminum (Kasei Optonix, Ltd. make, name-of-article P22-GY, and luminescence peak 535nm) were used for the fluorescent substance 36. Although the epoxy resin was used in this example as a base material which distributes a fluorescent substance 36, it is not necessarily limited to this and transparent ingredients, such as silicon resin, a urea-resin, or glass, can be used. Although considered as the configuration which distributes a fluorescent substance 36 uniformly in fluorescent substance resin 35

in this example, dip can also be established in concentration distribution of a fluorescent substance 36 within fluorescent substance resin 35. For example, two or more fluorescent substance resin layers from which fluorescent substance 36 concentration differs using the epoxy resin with which fluorescent substance 36 concentration differs are formed in the cup section 33. Moreover, fluorescent substance 36 concentration can also be changed continuously. The dispersing agent which becomes fluorescent substance resin 35 from titanium oxide, titanium nitride, tantalum nitride, an aluminum oxide, oxidization silicon, barium titanate, etc. can also be included. By including a fluorescent substance 36 in the below-mentioned closure resin 50, fluorescent substance resin 35 is also omissible. That is, it will fill up with the closure resin 50 containing a fluorescent substance 36 also in the cup section 33 in this case. Also in this case, dip can be prepared in closure resin 50 like the case in the above-mentioned fluorescent substance resin 35 at concentration distribution of a fluorescent substance 36.

[0028] Wirebonding of the p electrode 18 and the n electrode 19 of a light emitting device 10 is carried out to leadframes 31 and 30 with wires 41 and 40, respectively. Then, a part of light emitting devices 10, leadframes 30 and 31, and wires 40 and 41 are closed by the closure resin 50 which consists of an epoxy resin. Although especially definition will not be carried out if the ingredient of closure resin 50 is transparent, others, silicon resin, a urea-resin, or glass is used suitably. [epoxy resin] Moreover, it is desirable to be formed with the same ingredient as the ingredient of fluorescent substance resin 35 from viewpoints, such as an adhesive property with fluorescent substance resin 35 and a refractive index. Although closure resin 50 is formed for the object, such as protection of component structure, it can give the lens effectiveness to closure resin 50 by changing the configuration of closure resin 50 according to an object. For example, it can fabricate in an others and concave lens mold or a convex lens mold etc. [mold / which is shown in drawing 1 / shell] Moreover, it can see from [of light] ejection (it sets to drawing 1 and is the upper part), and the configuration of closure resin 50 can be made into circular, an ellipse form, or a rectangle. A fluorescent substance 36 can be distributed not only when the above-mentioned fluorescent substance resin 35 is omitted, but in closure resin 50. Moreover, a dispersing agent can be included in closure resin 50. The directivity of the light from a light emitting device 10 can be made to ease by using a dispersing agent. As a dispersing agent, titanium oxide, titanium nitride, tantalum nitride, an aluminum oxide, oxidization silicon, barium titanate, etc. are used. Furthermore, a coloring agent can also be included in closure resin 50. A coloring agent is used in order that a fluorescent substance may

prevent that a characteristic color is shown in the burning condition or putting-out-lights condition of a light emitting device 10. Furthermore, when the light from a light emitting device 10 contains many wavelength of an ultraviolet-rays field, improvement in a life can be aimed at by including an ultraviolet ray absorbent in closure resin 50. In addition, a fluorescent substance 36, a dispersing agent, a coloring agent, and an ultraviolet ray absorbent are independent, or can choose two or more from these as arbitration, and can be made to contain it in closure resin 50.

[0029] In addition to the above-mentioned light emitting device 10, other light emitting devices can also be used collectively. As other light emitting devices, a light emitting device 10 and the light emitting device from which luminescence wavelength differs are used. The light emitting device which has preferably the luminescence wavelength which a fluorescent substance is excited [wavelength] substantially and does not make it emit light is used. By using other starting light emitting devices, it can consider as the luminescence equipment with which colors other than a white system can also emit light. Moreover, a brightness rise can also be aimed at, using a light emitting device 10 two or more.

[0030] The luminescence equipment 1 of this example is used as the light source which irradiates a specific irradiated member not to mention being used as the light source in the below-mentioned display, a signal, etc. For example, a fluorescent substance is used as an irradiated member. In order to use an irradiated member as a fluorescent substance, fluorescent paint is applied to the irradiated member concerned, or fluorescent paint is mixed with the formation ingredient of an irradiated member. Furthermore, when an irradiated member consists of fiber, the fiber to which fluorescent paint was added is woven in. By making the light from luminescence equipment 1 irradiate an irradiated member, especially, luminescence with the characteristic fluorescent substance in an irradiated member can be carried out by the light from the primary light source, and the design of an irradiated member front face can be changed.

[0031] (Example 2) It could set on the 1st aspect of affairs of this invention, and the planar type Zener light emitting device 150 was used as a light emitting device with the luminescence equipment 2 which is the example of 1. Drawing 5 is the enlarged drawing of light emitting device 150 part. The same sign is given to the same member as the light emitting device 1 in an example 1, and the explanation is omitted. A light emitting device 150 deletes electrodes 17, 18, and 19 from the light emitting device 10 shown in drawing 1 , and fixes this to the form of a flip chip on a silicon substrate 151. The p mold GaN contact layer 15 of a light emitting

device 10 is connected to p mold field of a silicon substrate 151 through the metal-electrode layer 153. Although the ingredient of this metal-electrode layer 153 will not be limited especially if ohmic contact is obtained between a silicon substrate 151 and the p mold GaN contact layer 15, a gold alloy etc. can be used, for example. The n mold GaN contact layer 13 of a light emitting device 10 is connected to n mold field of a silicon substrate 151 through a metal electrode 155. Although the ingredient of this metal-electrode layer 155 will not be limited especially if ohmic contact is obtained between a silicon substrate 151 and the n mold GaN contact layer 13, aluminum alloy etc. can be used, for example. p mold part of a silicon substrate 151 is connected to a leadframe 31 by the wire 41.

[0032] (Example 3) Drawing 6 is the sectional view of the chip mold LED 3 which is an example in the 1st aspect of affairs of this invention. The same sign is given to the same member as the luminescence equipment 1 of an example 1, and the explanation is omitted. In a case 60, a light emitting device 10 uses a silver paste etc., and is fixed. Wires 40 and 41 connect each electrode of a light emitting device 10 to the electrodes 61 and 62 in which it was prepared by the case, respectively. Closure resin 65 distributes uniformly the fluorescent substance 36 which becomes transparent base materials, such as an epoxy resin, silicon resin, or a urea-resin, from ZnS:Cu, and Au and aluminum (Kasei Optonix, Ltd. make, name-of-article P22-GY, and luminescence peak 535nm), and covers a light emitting device 10 and wires 40 and 41. The chip mold LED 3 carries out luminescence of a white system as a whole with the color mixture of the light in which a fluorescent substance 36 excites and emits light by luminescence from a light emitting device 10, and the light taken out from a light emitting device 10 direct picking.

[0033] (Example 4) Drawing 7 is the elements on larger scale of the display 200 used combining the luminescence equipment 1 (henceforth "W-LED") of an example 1, and each LED of RGB. An indicating equipment 200 can be used for a full color LED display etc. A display 200 is equipped with the display 201 of an outline rectangle, and the LED unit 202 constituted by the display 201 by each LED and W-LED of RGB is arranged in the shape of a matrix. Arrangement of each LED in the LED unit 202 can be chosen as arbitration.

[0034] Hereafter, the method of presentation of a display 200 is explained, referring to drawing 8 . The image data inputted from the input section 210 is temporarily saved for the image data storage means 220. The pattern selection circuitry which is not illustrated, an intensity modulation circuit, and a flash circuit are built in a control section 230, and the control signal which controls the burning condition of each LED unit 201 according to the image data saved for the image data storage

means 220 is outputted. The brightness and color according to a control signal light up, it has each LED unit 201, and a specific configuration etc. is displayed on a display 201 by specific brightness and a specific color. In a display 200, although considered as the LED unit combining each LED and W-LED of RGB, an LED unit can be constituted only from W-LED and the display which can display the configuration of arbitration etc. can be obtained by arranging this in the shape of a matrix with a display 201 then white (W-LED is turned on), or black (W-LED is switched off). Also in this case, gradation control of the brightness of each LED unit can be carried out, and utilization is possible for the LED display of monochrome etc.

[0035] (Example 5) Drawing 9 is drawing having shown the signal 300 for cars using the chip mold LED 3. A signal 300 is equipped with a display 302 and the chip mold LED 3 is arranged in the shape of a matrix at a display 302. The sign 301 in drawing is a case. Covering of the colored transparence which is not illustrated is put on a display 302. The light of the white system which produces each LED3 when a burning condition is controlled by the control means and LED3 lights up is colored and checked by looking by passing covering of colored transparence. It can also consider as the signal which displays white by, of course using transparent and colorless covering. Supply of the power source to each LED3 is performed by connecting each LED3 juxtaposition-wise or in serial. When connecting in serial, LED3 can be divided into two or more groups, and a power source can also be supplied for every group. For example, it can consider as the display 302 by which LED has been arranged as a whole circularly by arranging each LED group so that a concentric circle may be drawn in a display. In addition, it can also carry out for every LED group also about control of a burning condition.

[0036] By using the chip mold LED 3 in the shape of a matrix, and forming the light source, light can be made to emit by uniform brightness over the whole display, and the unevenness of the brightness produced when the conventional electric bulb is used is reduced. By controlling a burning condition for every LED group as mentioned above, the display from which brightness differs selectively is also possible. In addition, the configuration method and arrangement consistency of the chip mold LED 3 can be chosen as arbitration according to the object.

[0037] (Example 6) The linear light source 400 and the source 500 of sheet-like light which used the chip mold LED 3 for drawing 10 are shown. The outline configuration of the linear light source 400 is carried out from the chip mold LED 3, a transparent material 401, and a case 403. A transparent material 401 is a product made of an epoxy resin. Of course, other transparent resin etc. can also be

used as a transparent material. The dispersion agent which is not illustrated makes the transparent material 401 have contained uniformly, and uniform luminescence is enabled. Although the transparent transparent material was used in this example, a specific color can also be made into the linear light source which emits light by coloring a transparent material. Moreover, a transparent material is made to contain a suitable fluorescent substance, and it can also consider as the linear light source which emits light in a specific color according to a fluorescence operation of the fluorescent substance concerned. A linear light source 400 is used as a guide of for example, various meter.

[0038] The source 500 of sheet-like light arranges linearly two or more chip molds LED 3 to a case 503, and attaches the transparent material 501 on a flat surface in the luminescence direction of LED3. A transparent material 501 is a product made of an epoxy resin, and contains the dispersion agent which is not illustrated. A reflective member can also be prepared in the side face in which the rear face and LED3 of a transparent material 501 are not arranged. It can use by preparing this reflective member as the light source which has brightness sufficient also as a back light of the liquid crystal display monitor which the luminous efficiency from a front face improves, for example, is used for a personal computer etc.

[0039] (Example 7) Drawing 11 is drawing showing the color conversion filter 600 which used LED605. The outline configuration of the color conversion filter 600 is carried out from LED605 and the color conversion sheet 610, and the transparent material layer 603. LED605 is the configuration in which omitted the epoxy resin 35 containing the fluorescent substance 36 with which the cup section 33 is filled up, and the cup section 33 was also made to fill up with closure resin 50 in the luminescence equipment 1 which is the above-mentioned example. Other configurations are the same as that of luminescence equipment 1. In addition, LED of a chip mold can also be used. The color conversion sheet 610 consists of a transparence sheet 602 which consists of a fluorescent substance layer 601 and transparent resin. The fluorescent substance layer 601 makes transparent base materials, such as an epoxy resin, silicon resin, or a urea-resin, distribute the fluorescent substance which consists of ZnS:Cu, and Au and aluminum (Kasei Optonix, Ltd. make, name-of-article P22-GY, and luminescence peak 535nm). As an ingredient of the transparence sheet 602, PET was used by this example. It is desirable to prepare detailed irregularity in the front face of the fluorescent substance layer 601. It is for preventing that improve concordance with the glass installed in the top face of the fluorescent substance layer 601 and the fluorescent substance layer 601, and a blot comes out in an interface. Moreover, it is desirable

to prepare detailed irregularity also in an adhesion side with the transparent material layer 603 of the transparence sheet 602. It is for preventing adhesion with the transparence sheet 602 and the transparent material layer 603, and preventing that a blot comes out in an interface. The transparent material layer 603 is a product made of an epoxy resin. Of course, the transparent material layer 603 can also be formed with the transparent resin of others, such as silicon resin, etc. The reflective film 604 is formed in the underside of the transparent material layer 603, and the leakage of the light from transparent material layer 603 underside is prevented. Especially the construction material of a reflecting layer 604 is not limited, and can also omit a reflecting layer 604. The light from LED605 is introduced from the side face of the transparent material layer 603, and is taken out from the fluorescent substance layer 601 side. In case the fluorescent substance layer 601 is passed, excite a part of light from LED605, it makes a fluorescent substance emit light, the light from this fluorescent substance and the light from LED605 are mixed, and the light of a white system is taken out as a whole. LED which has luminescence wavelength which is different from LED605 as the light source in addition to LED605 can also be used, and various colors can be used as the color conversion filter which can emit light by controlling the burning condition of such LED.

[0040] (Example 8) Drawing 12 is drawing showing the luminescence equipment 700 of the cap type which is the example of 1 in the 1st aspect of affairs of this invention. The same sign is given to the same member as the luminescence equipment 1 which is the above-mentioned example, and the explanation is omitted. The resin containing a fluorescent substance is not filled up with luminescence equipment 700 in the cup section 33, but the fluorescent substance layer 710 which consists of an epoxy resin containing a fluorescent substance 36 covers closure resin 50, and is formed. Other configurations are the same as that of luminescence equipment 1. In case a part of light from a light emitting device 10 penetrates the fluorescent substance layer 710, it excites a fluorescent substance 36 and makes it emit light. When the light which penetrates the light and the fluorescent substance layer 71 from this fluorescent substance 36, and is given off direct picking is mixed, luminescence equipment 700 carries out luminescence of a white system as a whole. The thickness of the fluorescent substance layer 700 of the top-face part 715 of the fluorescent substance layer 700 and the side-face part 713 is changed. By thickening the fluorescent substance layer 700 of the direction of a top face which is the main direction of ejection of light, it is for obtaining luminescence uniform as the whole luminescence equipment. After the fluorescent

substance layer 700 forms closure resin 50, it covers closure resin 50 by die forming etc. like closure resin 50, and is formed. Moreover, after preparing the resin containing the fluorescent substance 36 fabricated in the shape of a cap and forming closure resin 50, this can be put on closure resin 50 and it can also consider as the fluorescent substance layer 700. Thermoplastics, such as thermosetting resin, such as a urea-resin besides the epoxy resin in this example, and polyethylene, etc. can be used as an ingredient of the fluorescent substance layer 700. The dispersing agent which becomes the fluorescent substance layer 700 from titanium oxide, titanium nitride, tantalum nitride, an aluminum oxide, oxidization silicon, barium titanate, etc. can also be included.

[0041] (Example 9) Drawing 13 is drawing showing the luminescence equipment 750 which is the example of 1 in the 2nd aspect of affairs of this invention. The same sign is given to the same member as the luminescence equipment 1 of the above-mentioned example 1, and the explanation is omitted. The spec. of each class of a light emitting device 10 is as having explained in the above-mentioned example 1. Moreover, the light emitting device which prepared the reflecting layer as shown in drawing 3 or drawing 4 like the case of the above-mentioned example 1 can be used.

[0042] The cup section 33 is filled up with the epoxy resin (henceforth "fluorescent substance resin") 802 which distributed uniformly two kinds of fluorescent substances 801 and 803. In this example, the content ratio of a fluorescent substance 801 and a fluorescent substance 803 was set to 4-6:1. The cup section 33 can also be filled up with this fluorescent substance resin 802 after the below-mentioned wirebonding. Moreover, before mounting a light emitting device 10 on the cup section 33, the layer containing fluorescent substances 801 and 803 may be formed in the front face of a light emitting device 10. For example, by dipping a light emitting device 10 into the epoxy resin containing a fluorescent substance, a fluorescent substance resin layer is formed in the front face of a light emitting device 10, a silver paste is used for the cup section 33, and a light emitting device 10 is mounted on it after that. As the formation approach of a fluorescent substance resin layer, it is based on the above-mentioned DIP, and also sputtering, spreading, or paint can also be used. In addition, the configuration which carried out the laminating of the fluorescent substance resin layers 802 and 804 which made the cup section 33 distribute fluorescent substances 801 and 803, respectively one by one like the luminescence equipment 760 shown in drawing 14 is also employable.

[0043] ZnS:Cu and aluminum (Kasei Optonix, Ltd. make, name-of-article P22-GN4,

and luminescence peak 530nm) were used for the fluorescent substance 801. Although the epoxy resin was used in this example as a base material which distributes fluorescent substances 801 and 803, it is not necessarily limited to this and transparent ingredients, such as silicon resin, a urea-resin, or glass, can be used. Moreover, CaS:Eu (Nemoto& Co., Ltd. make, trade name "RAS", and luminescence peak about 645nm) was used for the fluorescent substance 803. This fluorescent substance 803 carries out pink luminescence to the excitation light of blue thru/or a bluish green color.

[0044] In this example, although fluorescent substances 801 and 803 were uniformly distributed in fluorescent substance resin 802, dip can also be established in concentration distribution of a fluorescent substance gradually thru/or continuously. For example, the laminating of the transparence resin with which the contents (concentration) of fluorescent substances 801 and 803 differ is carried out to order into a cup 33 so that a light emitting device 10 may be covered. Moreover, various dispersing agents can be included in fluorescent substance resin 802 like the case of an example 1. It is the same as that of an example 1 that closure resin 50 is made to contain fluorescent substances 801 and 803, and fluorescent substance resin 802 can be omitted.

[0045] Wirebonding of the p electrode 18 and the n electrode 19 of a light emitting device 10 is carried out to leadframes 30 and 31 with wires 41 and 40, respectively. Then, a part of light emitting devices 10, leadframes 30 and 31, and wires 40 and 41 are closed by the closure resin 50 which consists of an epoxy resin. About the construction material and the configuration of closure resin 50, various things are adopted like an example 1. Moreover, it is the same as that of the case of an example 1 that a dispersing agent, a coloring agent, or an ultraviolet ray absorbent can be included in closure resin 50.

[0046] In addition to the above-mentioned light emitting device 10, the light emitting device of a red system can also be used. For example, the light emitting device of a red system is adjacently arranged to a light emitting device 10 at the cup section 33. Moreover, it can also mount on the leadframe prepared separately. When a red component is insufficient for the luminescent color of luminescence equipment 750, this can be filled up, and the white light of high quality can be made to emit light more by using the light emitting device of a red system. Moreover, the luminescent color of luminescence equipment 750 can also be changed by controlling the burning condition of the light emitting device of a red system. Moreover, light emitting devices other than a red system can also be used collectively. By using other starting light emitting devices, it can consider as the

luminescence equipment with which colors other than a white system can also emit light. Moreover, a brightness rise can also be aimed at, using a light emitting device 10 two or more.

[0047] The luminescence equipment 750 of this example is used as the light source which is used as the light source in a display, a signal, etc., and irradiates a specific irradiated member like the luminescence equipment 1 of an example 1.

[0048] (Example 10) Drawing 15 is drawing showing the luminescence equipment 800 which is the example of 1 in the 2nd aspect of affairs of this invention. The same sign is given to the same member as the luminescence equipment 1 of the above-mentioned example 1, or the luminescence equipment 750 of an example 9, and the explanation is omitted. The spec. of each class of a light emitting device 10 is as having explained in the above-mentioned example 1. Moreover, the light emitting device which prepared the reflecting layer as shown in drawing 3 or drawing 4 like the case of the above-mentioned example 1 can be used. A light emitting device 810 is a red system light emitting device made from gallium aluminum arsenic, and the configuration is shown in drawing 16 .

[0049] A light emitting device 10 and a light emitting device 810 adjoin, and are mounted on the cup section 33 of a leadframe 30 through adhesives 20 and 825, respectively. The cup section 33 is filled up with the epoxy resin (henceforth "fluorescent substance resin") 805 which distributed the fluorescent substance 801 uniformly. The cup section 33 can also be filled up with the epoxy resin containing this fluorescent substance 801 after the below-mentioned wirebonding. Moreover, before mounting a light emitting device 10 and a light emitting device 810 on the cup section 33, the layer containing a fluorescent substance 801 may be formed in the front face of a light emitting device 10. For example, by dipping a light emitting device 10 into the epoxy resin containing a fluorescent substance 801, a fluorescent substance resin layer is formed in the front face of a light emitting device 10, a silver paste is used for the cup section 33, and a light emitting device 10 is mounted on it after that. As the formation approach of a fluorescent substance resin layer, it is based on the above-mentioned DIP, and also sputtering, spreading, or paint can also be used.

[0050] Wirebonding of the p electrode 18 and the n electrode 19 of a light emitting device 10 is carried out to leadframes 30 and 31 with wires 41 and 40, respectively. Moreover, the n electrode 815 of a light emitting device 810 is connected to a leadframe 31 by the wire 820. Then, a part of light emitting devices 10 and light emitting devices 810, leadframes 30 and 31, and wires 40 and 41,820 are closed by the closure resin 50 which consists of an epoxy resin. About the construction

material and the configuration of closure resin 50, various things are adopted like an example 1. Moreover, it is the same as that of the case of an example 1 that a dispersing agent, a coloring agent, or an ultraviolet ray absorbent can be included in closure resin 50.

[0051] In addition to the above-mentioned light emitting devices 10 and 810, other light emitting devices can also be used collectively. As other light emitting devices, light emitting devices 10 and 810 and the light emitting device from which luminescence wavelength differs are used. The light emitting device which has preferably the luminescence wavelength which a fluorescent substance is excited [wavelength] substantially and does not make it emit light is used. By using other starting light emitting devices, it can consider as the luminescence equipment with which colors other than a white system can also emit light. Moreover, a brightness rise can also be aimed at, using light emitting devices 10 and 810 two or more. In addition, in this example, although considered as the configuration which mounts a light emitting device 10 and a light emitting device 810 on the cup section 33 of the leadframe 30 of 1, a light emitting device 810 can also be mounted on the cup section 833 of the leadframe 830 prepared separately like the luminescence equipment 806 shown in drawing 17 . In this case, the n electrode 815 of a light emitting device 810 is connected to a leadframe 831. Since a power source is supplied to a light emitting device 10 and a light emitting device 810 through a different leadframe according to such a configuration, the luminescence mode of each light emitting device can be controlled according to an individual, and adjustment of the luminescent color as the whole luminescence equipment is attained. Moreover, a leadframe 831 can be omitted and the n electrode 815 of luminescence equipment 810 can also be connected to a leadframe 31. Although formed in one with luminescence equipment 806 by closing leadframes 30 and 31,830,831 by closure resin 50 in light emitting devices 10 and 810 and a list, each light emitting device and the leadframe corresponding to it can also be closed by respectively separate closure resin.

[0052] The luminescence equipments 800 and 806 of this example are used as the light source which is used as the light source in a display, a signal, etc., and irradiates a specific irradiated member like the luminescence equipment 1 of an example 1.

[0053] (Example 11) Drawing 18 is the sectional view of the chip mold LED 807 which is the example of 1 in the 2nd aspect of affairs of this invention. The same sign is given to the same member as the luminescence equipment 800 of an example 10, and the explanation is omitted. In a case 860, light emitting devices 10

and 810 use a silver paste etc., and are fixed. Wires 40 and 41 connect each electrode of a light emitting device 10 to the electrodes 861 and 862 in which it was prepared by the case, respectively. Moreover, a wire 820 connects the n electrode 815 of a light emitting device 810 to n electrode of a light emitting device 10. Of course, direct continuation of the n electrode 815 of a light emitting device 810 may be carried out to an electrode 861 with a wire 820. Closure resin 865 distributes uniformly the fluorescent substance 801 which becomes transparent base materials, such as an epoxy resin, silicon resin, or a urea-resin, from ZnS:Cu and aluminum (Kasei Optonix, Ltd. make, name-of-article P22-GN4, and luminescence peak 530nm), and covers wires 40, 41, and 820 in light emitting devices 10 and 810 and a list. A part of light from a light emitting device 10 is changed into the light of a green system by the fluorescent substance 801. The light of this green system, the light of the blue system taken out from a light emitting device 10 direct picking, and the light of the red system from a light emitting device 810 are mixed, and the white light is taken out as a whole.

[0054] (Example 12) Drawing 19 is the front view of the source 900 of sheet-like light using the chip mold LED 807, and, similarly drawing 20 is an I-I line sectional view. The source 900 of field Uemitsu is suitably used as a back light of a full color display liquid crystal display. The source 900 of sheet-like light consists of the 2nd light guide plate 903 which is the shape of the light source section 901, the 1st cylindrical light guide plate 902, and a field which builds in the chip mold LED 807 as light sources. The chip mold LED 807 is LED in the above-mentioned example 10, and emits light in the white light. Although considered as the configuration which introduces the light from LED807 into the 1st light guide plate 902 from a longitudinal direction (field 902a side) in this example, of course, it is not limited to this, and the 1st light guide plate 902 can form a light-emitting part 901 caudad, for example, light can also be introduced from the lower part (field 902c side) of the 1st light guide plate 902. Moreover, the number of LED807 used is not limited, either, but plurality can also be used.

[0055] The 1st light guide plate 902 consists of a transparent ingredient, for example, can use methacrylic resin, polycarbonate resin, etc. as the ingredient. The light from LED807 is introduced into the 1st light guide plate 902 from optical installation side 902a which counters LED807. The introduced light is emitted from light emission side 902b which counters the 2nd light guide plate 903. That bleedoff of a uniform light from light emission side 902b should be enabled, and the leakage from the side face concerned of light should be prevented, surface roughening of the front face is carried out to the side face (902c, 902d, 902e) of the

1st light guide plate 902 other than optical installation side 902a and light emission side 902b, and the light reflex layer 910 is formed in it. As the approach of surface roughening, etching, sandblasting, an electron discharge method, etc. are mentioned, for example. Moreover, white printing may be performed instead of surface roughening, or a white tape may be stuck, and the light reflex layer 910 may be formed. In the near field from LED807, it is desirable that the consistency is continuous or to form so that it may become large gradually as the light reflex layer 910 is formed in a low consistency and keeps away from LED807. By doing in this way, echo of an efficient light and diffusion are performed in the field where the distance from LED807 is distant, consequently bleedoff of a uniform light is acquired over the whole regardless of the distance from LED807.

[0056] The light emitted from light emission side 902b of the 1st light guide plate 902 is introduced into the 2nd light guide plate 903 from optical installation side 903a of the 2nd light guide plate. The 2nd light guide plate 903 consists of a transparent ingredient, and is formed with methacrylic resin, Pori Carver Nate resin, etc. like the 1st light guide plate. The light introduced from optical installation side 903a is emitted outside from light emission side 903b. The light reflex layer 920 is formed in the front face of light emission side 903b and side-face 903c of the 2nd light guide plate which counters of split-face processing, white printing, or pasting of a white tape. As the approach of split-face processing, etching, sandblasting, an electron discharge method, etc. are mentioned, for example. It is desirable to form so that the area or consistency may become large as the light reflex layer 920 keeps away from optical installation side 903a. It is because it sets in a location distant from optical installation side 903a, light is reflected and diffused efficient and bleedoff of a uniform light is enabled over the whole light emission side 903b.

[0057] Although LED807 was used as the light source in this example, of course, the luminescence equipment 750 of the above-mentioned example 9 or 760 can also be used. Moreover, LED of a blue system and LED of a red system can also be used as the light source instead of LED of a white system. In this case, the color conversion layer in which the fluorescent substance was included is prepared separately. For example, a color conversion layer can be prepared between the light source section 901 and a light guide plate 902 or between a light guide plate 902 and a light guide plate 903. Moreover, a light guide plate 902 can be made to be able to distribute a fluorescent substance, and it can also consider as a color conversion layer. In case the light from LED of a blue system passes a color conversion layer, the part excites a fluorescent substance, makes it emit light, and

makes the light of a green system emit light according to this configuration. The light of this green system, the light of the blue system from LED of a blue system, and the light of the red system from LED of a red system are mixed, and the light of a white system is obtained. Mixing of light is efficiently performed by making a color conversion layer distribute a light diffusion agent. Moreover, a light guide plate 902 can be made to be able to distribute a light diffusion agent, and light can also be mixed within a light guide plate 902. Furthermore, an optical diffusion layer may be established separately.

[0058] As mentioned above, although the example of the luminescence equipment in the 2nd aspect of affairs was explained, the example of application of the luminescence equipment in the 2nd aspect of affairs is not restricted to the above-mentioned example, and is applied also to the display which is an example in the 1st aspect of affairs, a signal, a linear light source, the source of sheet-like light, a color conversion filter, and cap type luminescence equipment.

[0059] This invention is not limited to explanation of the gestalt of implementation of the above-mentioned invention, and an example at all. It does not deviate from the publication of a claim but deformation modes various in the range this contractor can hit on an idea of easily are also contained in this invention.

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing the luminescence equipment 1 of the example of 1 in the 1st aspect of affairs of this invention.

[Drawing 2] It is the outline sectional view of the light emitting device 10 similarly used for luminescence equipment 1.

[Drawing 3] It is the outline sectional view of the light emitting device 100 of other configurations similarly equipped with a reflecting layer directly under a luminous layer.

[Drawing 4] It is the outline sectional view of the light emitting device 101 which similarly equips with a reflecting layer the field in which the semi-conductor layer of a substrate is not formed.

[Drawing 5] It is the elements on larger scale of the luminescence equipment which used the planar type Zener light emitting device 150 which are other examples in the 1st aspect of affairs of this invention.

[Drawing 6] It is drawing showing the chip mold LED 3 which are other examples in the 1st aspect of affairs of this invention.

[Drawing 7] It is the elements on larger scale of the display 200 which are other examples in the 1st aspect of affairs of this invention.

[Drawing 8] It is drawing showing the circuitry in a display 200 similarly.

[Drawing 9] It is drawing showing the signal 300 which are other examples in the 1st aspect

of affairs of this invention.

[Drawing 10] It is drawing showing the linear light source 400 and the source 500 of sheet-like light which are other examples in the 1st aspect of affairs of this invention.

[Drawing 11] It is drawing showing the color conversion filter 600 which are other examples in the 1st aspect of affairs of this invention.

[Drawing 12] It is drawing showing the luminescence equipment 700 of the cap type which are other examples in the 1st aspect of affairs of this invention.

[Drawing 13] It is drawing showing the luminescence equipment 750 which is the example of 1 in the 2nd aspect of affairs of this invention.

[Drawing 14] It is drawing showing the luminescence equipment 760 of a configuration of differing similarly.

[Drawing 15] It is drawing showing the luminescence equipment 800 which is the example of 1 in the 2nd aspect of affairs of this invention.

[Drawing 16] It is the outline sectional view of the red system light emitting device 810 similarly used for luminescence equipment 800.

[Drawing 17] It is drawing showing the luminescence equipment 806 of other configurations similarly.

[Drawing 18] It is drawing showing the chip mold LED 807 which are other examples in the 2nd aspect of affairs of this invention.

[Drawing 19] It is drawing having shown the source 900 of sheet-like light used for the full color display liquid crystal display which are other examples in the 2nd aspect of affairs of this invention.

[Drawing 20] Similarly it is an I-I line sectional view in drawing 19 of the source 900 of field Uemitsu.

[Description of Notations]

1 750 760 800 806 Luminescence Equipment

3 807 Chip Mold LED

10 810 Light Emitting Device

35 802 804 805 865 Fluorescent Substance Resin

36 801 803 Fluorescent Substance

50 65 Closure Resin

200 Display

202 Luminescence Unit

300 Signal

400 Linear Light Source

500 900 Source of Sheet-like Light

401 501 Transparent Material

600 Color Conversion Filter

610 Color Conversion Sheet

700 Cap Type LED

710 Fluorescent Substance Layer

810 Red System Light Emitting Device

902 903 Light Guide Plate